Scanning the Past

Vladimir K. Zworykin

Sixty years ago this month, the PROCEEDINGS OF THE INSTITUTE OF RADIO ENGINEERS (IRE) included a paper on the iconoscope, described as part of an all-electronic television system being developed at the Radio Corporation of America (RCA). The author of the January 1934 paper was Vladimir K. Zworykin, a Russian immigrant and a prolific inventor, who received the Morris N. Liebmann Memorial Award from the IRE in 1934 for his contributions to television. He was later to receive the IRE Medal of Honor in 1951 and the IRE established the annual Vladimir K. Zworykin Award in his honor in 1950 (continued by the IEEE to the present).

In his 1934 paper, Zworykin reported that the recently developed iconoscope replaced mechanical scanning apparatus and was far more sensitive than the older system. He explained that the iconoscope used a photo-sensitive mosaic where each element of the mosaic behaved as a "miniature photo-electric cell." Mosaic elements became charged by exposure to light and were subsequently scanned by a cathode ray beam to produce modulation of the television transmitter. Zworykin concluded that the iconoscope offered "new prospects" for achieving "high grade television transmission."

Zworykin was born in Mourom, Russia, in 1889 and graduated in electrical engineering from the Petrograd Institute of Technology in 1912. At Petrograd he studied under Boris Rosing who already was experimenting with a mechanical-scan television. Zworykin continued his education at the College de France in Paris from 1912 to 1914, where he investigated X-rays working under the eminent physicist Paul Langevin. During the first World War, Zworykin served as an officer in the Radio Corps of the Russian Army.

In 1919, Zworykin came to the United States, where he joined the Westinghouse Research Laboratory in Pittsburgh, PA. He also enrolled as a graduate student at the University of Pittsburgh where he received the Ph.D. degree in 1926. At Westinghouse, he carried out research on photoelectricity and vacuum tubes as well as television and facsimile. He published his first IRE paper in March 1929 on a facsimile system which he described as capable of transmitting good-quality pictures or written messages at a rate of 630 words per minute. He was coauthor of a book entitled *Photocells and Their Application* published in 1931.

In 1929, Zworykin moved from Westinghouse to RCA where he became research director of an electronics laboratory in Camden, NJ. RCA encouraged him to continue his work on television. He conducted tests during 1931–1932 which he disclosed in a December 1933 IRE paper. The contents of the paper indicated that he was still using a mechanical scanning transmitter along with a cathode-ray tube as a picture tube. Field tests of the iconoscope were carried out at the Camden laboratory during 1933–1934, using a 343–line picture transmitted at 30 frames per second. He later worked on a more sensitive image orthicon camera tube which combined features of the iconoscope and the image dissector tube of Philo T. Farnsworth.

Zworykin and his RCA colleagues also developed electron microscopes and infrared detectors which were used in World War II sniperscopes. He was coauthor of the book entitled *Television: The Electronics of Image Transmission* published in 1940. He was associate research director of RCA Laboratories from 1942 to 1945 and a vice president at RCA from 1947 until his retirement in 1954. He received the Lamme Medal of the American Institute of Electrical Engineers (AIEE) in 1948 and the Edison Medal from the IAEE in 1952. He was elected to both the National Academy of Sciences and the National Academy of Engineering and received the National Medal of Science in 1966. After retiring from RCA he worked as a director of a medical research laboratory at the Rockefeller Institute for several years. He received approximately 120 U.S. patents and was elected to the National Inventors Hall of Fame in 1977. He was a dedicated bird hunter and had many nontechnical interests, including music and art. He died at Princeton, NJ, in July 1982.

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